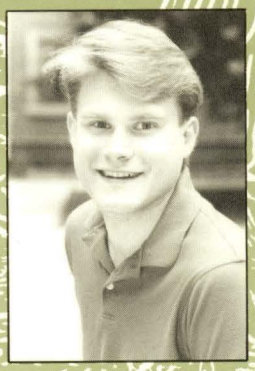
INSIDE: Alumni Survey

Fall 1990

ITEMS

UNIVERSITY OF MINNESOTA
INSTITUTE OF TECHNOLOGY

IT's best and brightest
Pp. 4–9



Features

Departments

ITEMS

University of Minnesota
Institute of Technology

Fall 1990

Items is published three times a year to inform Institute of Technology alumni and friends about news, interesting alumni and faculty, and relevant issues. Letters to the editor, requests to receive *Items*, and notices of address changes should be sent to the Office of External Relations, Institute of Technology, 107 Walter Library, 117 Pleasant St. S.E., University of Minnesota, Minneapolis, MN 55455. *Items* welcomes letters and ideas from all readers.

The University of Minnesota is an equal opportunity educator and employer.

About the cover: Each year the IT Alumni Society honors some of the Institute's top students for their participation and leadership in student organizations. Four of those students are featured in our cover story: (left to right) Kee Sook Han, Jim Willenbring, Loren Eyres, and Karen Schlangen. The cover illustration is from a print by Han. Photographs by Patrick O'Leary.

NEWS

Behind the ceremony

Helping with the ribbon cutting for the Microelectronics Research Laboratory were: (left to right) Bruce Roberts, Unisys; Bruce Merrifield, Greater Minnesota Corporation; Dean Mark Brenner, University of Minnesota; Dick Westerlund, IBM; Obert Tufte, Honeywell; Anand Gopinath, microelectronics laboratory director; Wallace Lindemann, former director of the laboratory; Robert Collins, electrical engineering department head; and Ettore Infante, IT dean.

Over the last 20 centuries, the products of human effort that have captured the mose awe are those envisioned and brought forth on a gargantuan scale: the pyramids of ancient Egypt, the Great Wall of China, the Hoover Dams and Golden Gate Bridges of the world.

During the past 20 years, the science of microelectronics has produced wonders of a different sort—wonders in which the next ooh or aah depends on scientists' ability to envision and bring forth ever smaller creations. The computing power that once filled a room now sits on our laps. And before you or I ever learn how to make full use of that computing power, it may well fit in our shirt pockets.

Whatever new microelectronic wonders the next 20 years bring, the Institute of Technology is planning to help lead the way. IT has had a long tradition of excellence in microelectronics and computer research and development. In the 1940s, electrical engineering department research on oxide cathodes in vacuum tubes broke new ground in surface analysis, which in turn opened the door to the development of semiconductors, solid state electronics, and magnetic film. In recent years, however, the limitations of outdated laboratory equipment severely limited microelectronics research at IT.

But on May 10, 1990, that picture changed. An open house and ribbon-cutting ceremony marked the dedication of the Institute of Technology's Microelectronics Research Laboratory on the ground floor of the new Electrical Engineering/Computer Science Building—a laboratory that can be equalled by only a handful of universities around the world. Much of the clean room area rests on elaborate vibration isolation pads that allow researchers to work on a microscopic scale without having to worry that vibrations from a delivery truck or intercampus bus will ruin their experiments. Elaborate and precise temperature

and humidity controls and air filters further safeguard the work that goes on in the laboratory. The major pieces of equipment have been installed, tested, and are up and running, including the gas-source molecular beam epitaxy system, which is capable of growing semiconductor compounds in layers a single atom or even half an atom thick.

The physical plant is impressive enough, but more impressive—and more important—is the research that already has been, is being, and will be done with the support of the microelectronics laboratory.

Assistant electrical engineering professor Stephen Chou and his graduate students recently constructed an ultra-high resolution electron beam lighography system by modifying a commercial scanning electron microscope and adding a beam pattern generator they designed and built. The system was built for less than one-tenth the cost of a commercial high resolution system, and Chou's group has already been able to produce rudimentary devices with patterns of a pitch size (the distance from the center of one circuit line to another) two times smaller than anyone else in the world. Stephen A. Campbell, also an assistant professor in electrical engineering, has developed a growth technique for germanium-silicon compounds that holds the potential to increase the speed of some microelectronic systems 100 fold.

More than 20 faculty members from the various disciplines supporting microelectronics research (including electrical engineering, mechanical engineering, physics, and chemical engineering and materials science) are currently conducting research or seeking funding for research that will tap into the tremendous potential offered by the new laboratory. From very broad-based research aimed at increasing the fundamental understanding of basic physical properties (such as magnetism) to very narrowly based research aimed at developing specific devices (such as thin film sensors that can be used to control "smart" cutting tools that automatically adjust to compensate for degradation of the cutting surfaces or shut the system down almost instantaneously if the tool breaks), the laboratory has opened the door to a new future for microelectronics research at IT. I

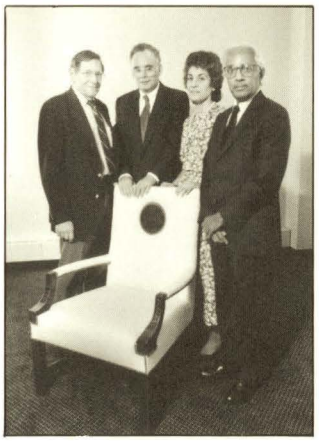
Early and late

Five IT faculty members received special recognition in June; four for outstanding performance early in their careers, and one for a stellar career at IT that spans nearly 30 years.

Mechanical engineering professor and department chair Richard Goldstein has been named a Regents' professor—the highest honor bestowed by the University on a faculty member. Only 20 professors at the University are Regents' professors. Goldstein was chosen from a group of 100 candidates nominated by students, deans, and colleagues.

Goldstein, who joined the IT faculty in 1961 as an associate professor, holds several patents in the field of energy transport and has received numerous professional honors. His research has applications in astrophysics, geophysics, and meteorology.

At the other end of the spectrum, assistant professors Keven Buckley (electrical engineering), Jeffrey Derby (chemical engineering and materials science), James Kakalios (physics), and Alon McCormick (chemical engineering and materials science) all received Presidential Young Investigator Awards from the National Science Foundation (NSF). Each investigator receives $25,000 from NSF, plus matching funds for up to $37,500 raised from private sources. I



The seat of honor

On May 10, electrical engineering professor Marshall Nathan was named to the Centennial Chair in Electrical Engineering in Microelectronics. Left to right: Robert Collins, electrical engineering department head; Marshall Nathan; Rosalie Nathan; V. Rama Murthy, associate vice president for academic affairs.

Corrections

Former professor and aeronautical engineering department head John D. Akerman was misidentified on page five of the Spring 1990 issue of ITEMS. Akerman is second from the right. We received our information from the label on a photo in archives, but several people who knew Akerman pointed out our mistake. We—and the label on the photo in archives—stand corrected. Also, in the "Faculty" department, aerospace engineering professor C.C. Hsiao was reported as retiring after 25 years in the department. Hsiao was with the department 35 years. I

Noted

Melinda L. Salisbury, a geoengineering undergraduate in civil and mineral engineering, received a $90,000 National Science Foundation Award for Creativity in Engineering. Salisbury, one of only 30 recipients nationwide, is now in graduate school working under the guidance of assistant professor Randal Barnes. ■ Khushrav Crawford, a graduate student in chemistry, received the 1990 Robert L. Ferm Teaching Assistant of the Year Award. The award, sponsored by the Pillsbury Company, was established in honor of Robert L. Ferm, an alumnus of the chemistry department (B.S. 1948, M.S. 1950) and former employee of Pillsbury. Ferm died in 1989. ■ Susan Reutzel, a graduate student in chemistry, won the Pauling Award for best student poster at the American Crystallographic Association Meeting in New Orleans, April 9-13. Her poster was titled "The Use of Hydrogen Bonds in the Preparation of Inside Cocrystals." ■ Astronomer Clyde Tombaugh, who in 1930 discovered the planet Pluto, presented the third annual Karlis Kaufmanis Lecture on April 27. Tombaugh spoke about Pluto and other highlights of his 60 years of exploring the skies. The lecture series is supported by friends and former students of retired University astronomy professor Karlis Kaufmanis, renown for his "Star of Bethlehem" lecture. ■ Professor K. Alex Muller of IBM Zurich Research Laboratory and the University of Zurich presented the Twelfth Abigail and John Van Vleck Lecture in May. Among other achievements, Muller was awarded the Nobel Prize in Physics in 1987 jointly with J. Georg Bednorz for research in superconductivity. ■ Professor Richard E. Smalley, the Gene & Norman Hackerman Professor of Chemistry at Rice University, presented the Spring Quarter Kolthoff Lectureship in Chemistry in May. I

The best and brightest

IT's top students take charge and get things done —their own way!

By Miriam Feldman

"They're in tune. They're involved. They're not just going to class and then bombing out of here." That's what makes students like Loren Eyres, Kee Sook Han, Karen Schlangen, and Jim Willenbring so special according to professor John Clausen, assistant dean of IT. Because of their involvement, these students—some of IT's best and brightest—received the IT Alumni Society (ITAS) Student Recognition Award this spring.

The award, given each year at the dean's reception, recognizes participation and leadership in student organizations. It is granted on the basis of recommendations from professors and the deans who work most closely with students, Russell Hobbie and John Clausen.

The ITAS award is important, says Hobbie, because it recognizes a key component of student life. "I firmly believe that a large part of what students learn in college is not from classes but from each other," Hobbie says. "That's why student leaders are so important."

This year, ITAS honored 27 students for their leadership in student organizations. We introduce four of IT's best and brightest to you on these pages.

Photos by Patrick O'Leary

Kee Sook Han is pursuing a double major in mathematics and electrical engineering, but still finds time for her printmaking. The illustrations for this story are from Han's prints.

Illustrations by Kee Sook Han

Breaking the code

Kee Sook Han got something of a run around before landing in IT. When the senior from Seoul, Korea, moved here six years ago, all she wanted to do was learn English. So she enrolled in a community education class to study the language. Along the way, she was referred from one educational institution to another by people who, no doubt, observed her aptitude for math and science. Her community education teacher referred her to a vocational technical institute, which in turn referred her to the University's General College. General College thought she was well suited for CLA, but CLA steered her to IT.

"Every time I had to do something, other people decided, and I followed," Han says, as though amazed by the turn of events in her life these past six years. Although she had intended to learn English before doing anything else, Han found herself in IT, majoring in mathematics and electrical engineering, less than two years

after settling in Minnesota.

Because she was still struggling with the language, Han's first two years in IT were filled with frustration. She still recalls the difficulty she had understanding her first physics lectures—she couldn't understand a word the professor said. But the language barrier didn't hold Han back. She mastered the material by reading the textbook at her own pace and through the encouragement of teaching assistants, professors, and her advisor.

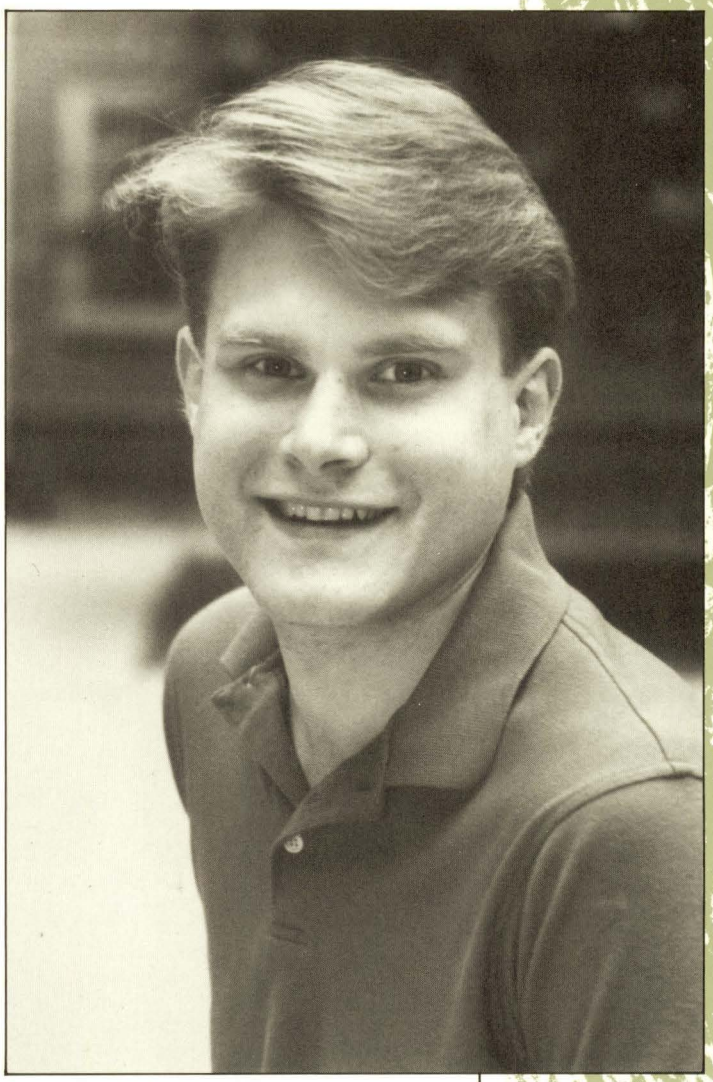
By the end of her sophomore year, Han felt more comfortable with English, and her determination was starting to pay off. She joined Tau Beta Pi, the honor society, and became a volunteer tutor and peer advisor through that organization. This past year she produced an honors project in which she designed a cryptography system that her advisor, professor John Kieffer, says was the best of the lot.

Cryptography is a fairly new field that uses mathematics to design computer software that will change a plain written text into a cipher text. Han had to absorb a lot of new material to write the software, but she studied everything Kieffer gave her on the subject. "I kept her pointed along the right track," Kieffer says, "but 99 percent of the work she did herself." Kieffer says he was "pretty sure she could do it," but even so, he was "pretty impressed" when he observed the finished product.

Han likes cryptography so much that she thinks of it as one of her hobbies. Her other hobbies—print making and sculpting—couldn't be more different. Han's interest in the studio arts developed almost as a fluke. She registered for a class in print making because it had no prerequisites. Once enrolled, however, she discovered that most of her classmates were art majors, and her confidence failed. Her confidence sank even lower after she completed her first assignment. "It was very shameful to show my print," she says. Ironically, but true to form, she finished the course with an A, and since then has gone on to take other print making courses and even designed the cover for the IT honors program brochure.

Han became so involved with studio arts that she toyed with the idea of switching majors. But an art professor encouraged her to stick with engineering, as she puts it, "for the safe life." In the meantime, Han finds that print making and sculpting are great outlets for the stress she feels when working on engineering projects.

Now that she's nearly finished with her double major in mathematics and electrical engineering, Han is looking ahead to the possibility of graduate school. If she goes, she wants to continue studying cryptography. Many cryptographers end up working for the CIA or National Security Agency, but Han is not interested in that. Ideally, she will find ways to apply cryptography to electrical engineering by developing software programs that will reduce the running time for computations in electrical engineering problems. Kieffer has encouraged her to go to Stanford University to study cryptography, but Han is reluctant to leave Minnesota.



Loren Eyres, electrical engineering

"It's very difficult to decide," she said. She speaks about the homesickness she felt when she first moved here, and about her gradual adjustment. "I really like Minnesota. It's like a second home," she says. "It's very difficult to move to another place again."

Very likely, she says, she will get a job for a while and think about going to graduate school later. But if her first six years here are any indication of the future, there will be no holding back Kee Sook Han.

An agent for change

Karen Schlangen recalls how scared she was during her first days at the University, five years ago. Compared to her 125-member high school class, the University seemed huge. But today, the University no longer overwhelms the senior from La Crescent. "To me, the University is a small place. I can do whatever I want and talk to any professor I want," she says.

No, nobody shrunk the University. Schlangen, a mechanical engineering and psychology major, merely found ways to make it seem smaller. And if she has her way, other students will learn how to feel at home at the University, too. Being in the IT lower division honors program helped Schlangen get her bearings, she says, because for the first two years the honors students—about 100 in all—took classes together.

What helped even more was jumping in and getting involved. Schlangen is so involved that a recent issue of *Minnesota Technolog* described her as "a student organization junkie." That's shorthand for saying that Schlangen is president and past treasurer of the IT Student Board (ITSB), secretary of the American Society of Mechanical Engineers, a member of the IT Board of Publications, a member of the Society of Women Engineers (SWE), and a member of the IT curriculum committee.

Schlangen's goal as ITSB president is to acquaint students with the organization. As liaison between faculty, administration, and students, the board can address and resolve student concerns, but students have to know it's there, Schlangen says. "There's this feeling of utter frustration because you can't get anything done," she says, "But people don't know the proper channels. I'd like students to be able to go to their representatives and express concerns."

Schlangen knows the channels and how to get things done. Recently, for example, she helped resolve a scheduling problem for a Fortran class. It's a requirement for all EE students, but the class was offered infrequently and at inconvenient times. Professors and administrators were unaware that students were having trouble fulfilling the requirement, Schlangen says, but once ITSB brought it to their attention, the problem was quickly remedied. "The faculty really wants student input. That's why we want the students to know we're here," she says.

"There's a feeling that this is a big, bureaucratic university, and if there's a problem you can't get anything done," Schlangen says. But the Fortran incident shows that's not true. "If you want, you can change things. IT's really not that big, if you break it down."

It's one thing to make changes within IT, but Schlangen has bigger changes in mind. In a recent issue of *Minnesota Technolog*, the official undergraduate publication for IT, Schlangen wrote an opinion piece challenging the entrenched sexism in engineering and asked why so few women are represented in engineering. Women must prove their competence at every step of the way, they are paid less than men, and they are victims of sexual harassment on the job, she wrote. "A woman must prove she is competent, whereas for a man it is simply assumed," Schlangen wrote. She exhorted people to examine their attitudes and their gender prejudices, because only then is change possible. "I believe we can combat the problems generated by this cultural bias against women through education of both young and old, and through awareness of our attitudes," she concluded.

In some ways, Schlangen has battled gender prejudices all her life. She is the youngest child and only girl in a family of four boys. Three of her brothers followed in their father's footsteps to become engineers, and the fourth works in a closely related field. As a child, Schlangen was constantly tested by her father and brothers. When she did something well, they rewarded her by saying she was "pretty good for a girl."

But at the University, Schlangen has proved that she is just plain good. In addition to the ITAS Student Recognition Award, Schlangen received the President's Student Leadership and Service Award. She also received a scholarship to the Integrated Degrees in Engineering, Arts, and Science program. The scholarship gives Schlangen the freedom to continue her pursuit of degrees in psychology and mechanical engineering.

Schlangen still isn't sure where all these interests will take her. She originally planned on law school after four years, but was sidetracked into engineering so she could pay her way through law school. Now she is considering going to graduate school and becoming a professor. She feels the need for female role models in IT and likes the thought of helping women who venture into the field in the future.

A double major means Schlangen will be around the University for another two years, but she doesn't mind. "I want to learn, so it doesn't bother me to be in school this long." She was delighted to receive the $2,400 scholarship since she is putting herself through school with the help of loans from her parents. But she doesn't mind having to pay her way. "Too many students get their college education handed to them on a silver platter," she says. "When I have to pay for every credit, I want to make sure I learn."

Triple Crown winner

Jim Willenbring reached the finish line in IT like a Triple Crown winner. The electrical engineering graduate received three awards last spring—the President's Student Leadership and Service Award, The Paul A. Cartwright/ITAS Outstanding Student Service Award, and the ITAS Student Recognition Award.

The trio of accolades meant a lot to Willenbring, but the Cartwright award means the most, he says. It is awarded to only one student, and, more importantly, it recognizes a student's cumulative experience at the University.

From the start, Willenbring sought ways to be involved in campus life, even though, as he sees it, commuter students rarely take that course of action. All too often, according to Willenbring, they come to classes and go home.

Not Willenbring. In his freshman year, he spotted a small notice seeking members to the IT Board of Publications—the governing body for *Minnesota Technolog* and the *Connection*. He applied and was accepted, and by his sophomore year was assistant editor of the *Technolog*.

By the time he was a junior, Willenbring was *Technolog* editor. He had to produce six issues that year and often found himself working 80-hour weeks to get the magazine out. Under his direction, production of the *Technolog* was streamlined with the help of a new Macintosh computer. Willenbring single-handedly put out the first desktop edition of the *Technolog* and then trained others to do the job. That year, the *Technolog* won first place as the best all-around magazine

Jim Willenbring, electrical engineering (above) and Karen Schlangen, mechanical engineering (right).

in a contest sponsored by the Engineering Colleges Magazine Association. One of his editorials also won top honors in that contest. Hours at the *Technolog* often were long, but they paid off, Willenbring says. In fact, if any one thing helped him win the Cartwright award, Willenbring believes it was his editorial work on the award-winning *Technolog*. "The Cartwright award made all the hours of sitting on top of the light board worth while," he says.

In his senior year, Willenbring found time to serve on the IT Student Board and on Tau Beta Pi's Ethics Committee. "Ethics is a personal interest of mine," Willenbring says, noting that he wrote two of his six editorials on the subject. "If you don't prepare yourself for making ethical decisions, you're not going to respond at the time; and chances are you'll buck under pressure."

Willenbring laments the fact that there is no class at the University on ethical decision making for engineers. In his award-winning editorial he urged engineers to look at the "big picture" and to consider the ramifications of their work. Too often, he wrote, engineers get involved in developing one small part of a larger project and never consider how the finished product will be used. He urged engineers to "examine and work with the details, but step back and take a good look at who you are affecting, how you are affecting them, and what consequences may come of the action."

Because of his penchant for writing, Willenbring at one time considered abandoning electrical engineering in favor of a technical communications degree. But he was so far along in the program by that time that he decided to finish it. His communications skills were honed in high school where English, social studies, and writing were emphasized. But science and engineering have always been an interest of his, too. Willenbring's father is a civil engineer, and his brother graduated from IT with a degree in civil engineering.

It is not surprising that the tension between these interests led to a career that combines both engineering and writing skills. Today, Willenbring is a technical writer at Medtronic where he is writing the manuals for pacemaker leads and will soon develop an educational and promotional program.

Now that he has his electrical engineering degree, Willenbring will pursue a master's degree in technical communications this fall at the University on a part-time basis.

In addition to his awards, Willenbring's involvement has paid off in other ways, too. It gave him the chance to really get to know other students and to feel comfortable at the University. "Getting involved in student organizations is a very good way to make the University a small place," he says. As he has learned, the University may be a big place, but students who get involved don't get lost in the crowd. They get recognized.

A different perspective

Electrical engineering graduate Loren Eyres thrives on doing things differently. But it wasn't always that way. For his first three years at the University he studied math and science almost exclusively. But then the muse hit him. His interest in English, which started when he was in high school in Maple Plain, reemerged, and Eyres decided to work on a double major.

At about the same time, the IDEAS program was created and Eyres was chosen to be in it. IDEAS, which stands for Integrated Degrees in Engineering, Arts, and Science, stresses the importance of a well-rounded education and emphasizes collaboration between IT and CLA. Eyres says the timing of the new program was almost uncanny—as if it were designed just for him.

He soon immersed himself in both worlds—liberal arts and science—although at times bridging the gap was difficult, even for someone who acknowledges that school has always been easy. "In engineering, the answer comes out 3.14," Eyres says. "In English, there are different ways of saying the same thing." Getting used to such different approaches was frustrating because Eyres was always looking for *the* answer. "I was looking for things to come out clean," he explains.

Eyres soon got the hang of it, though, and moved easily between the two worlds, studying literary analysis one hour, analytic mechanics the next, and poetry after that.

Although his mind "was flipping over every hour," the experience gave him a different perspective—one that helped him see engineering in a new light.

"If there's one thing English has taught me, it's that engineers often have an extremely narrow perspective on the way our actions affect the world around us," he says. Citing waste management as an example, he explains that engineers typically look at the problem by figuring out better ways to get rid of garbage. They never think of stepping back, looking at the big picture, and asking if there are ways to avoid producing so much waste in the first place.

Eyres says that his liberal arts training has prepared him to ask just such questions. In fact, it has made him rethink things he did in the past. After high school, for example, he spent over two years working in Honeywell's defense division without giving it a thought. Today, he admits he might think twice before taking on such work. "I don't know if I can conclude that engineers shouldn't do defense work, because that's not realistic," he says. "But the person who goes into the defense industry without thinking of the moral and ethical questions is making a mistake."

This theme was carried over in the commencement address he gave this past spring when he completed his electrical engineering degree. Eyres told his classmates that engineers have a responsibility to examine the implications of their work. Using religion as metaphor, he compared graduation to the ordination of a new generation of priests who will act as mediators between technology and the world it serves. Engineers must look at the wider consequences of their work, he says. "As students, the consequences affect only us. But when we get out and do engineering, the scope of our work broadens because millions of people may buy the products we create."

It's not surprising that Eyres chose religion to make his point. Religion has played a big role in his life. He committed the greater part of his spare time while at the University to the Intervarsity Christian Fellowship (ICF), serving two years as chapter president. It was through ICF that Eyres spent the summer of 1989 in Papua, New Guinea, as a volunteer for the Summer Institute of Linguistics (SIL). SIL conducts linguistics research and trains people to run literacy programs in villages. It was Eyres' job to keep the shortwave radio system working so that people at SIL headquarters could remain in contact with staff working in remote villages.

Although Eyres unabashedly admits that school has been easy—something that he attributes to "a function of God and my parents," he thinks he may be in for some humbling experiences this fall when he starts a graduate program in physics at Stanford University. "It's going to be the ultimate in technical competition," he concedes. "And suddenly, just ability isn't going to do it. It's going to be ability and a lot of work."

Eyres was drawn to Stanford by the strength of its technical programs and its English department. He doesn't know if he will have time to pursue his interest in English, but wants a good program available—just in case. If he does find the time, he will come closer to fulfilling his dream of being a professor with a joint appointment in physics and the humanities. I

Miriam Feldman is a freelance writer in the Twin Cities

MOVERS and SHAKERS

Companies founded by IT alumni fortify the economic health of Minnesota and the nation

Graduates of the Institute of Technology have had a tremendous impact on economic and technological development, both in this state and across the nation. Many of the leading companies in the computer industry—such as Cray Research, Control Data, and Sperry—were founded by IT alumni. IT alumni have demonstrated considerable success as entrepreneurs in other fields as well.

Furthermore, graduates of the Institute of Technology play a major role in technological and economic development through their intellectual achievements and by their leadership as key employees at thousands of other firms.

We are attempting to more accurately measure the impact IT alumni have in these areas and to enumerate the accomplishments of our alumni, such as awards, positions held, companies founded, community activities, and other achievements. The list on this page of firms founded by IT alumni is incomplete. The survey on the facing page will help us complete that list.

In addition to discovering more about your achievements, the survey will help us tailor ITEMS to serve our readership. It will also provide us with feedback regarding your experiences at IT and your current perceptions of the Institute. Please take a few moments to complete the survey and return it to us. We want to be able to recognize the achievements of all our alumni. I

Companies Founded by IT alumni

Company	*Founder/Co-founder*
4 Corners Exploration	Irving Rapaport 49Geo
ADC Telecommunications	Ralph E. Allison 30EE, Walt Lehnert 30EE
Al Johnson Construction	Algot Johnson 10ScM
Almay Research & Testing	Harry S. Brenner 45AE
Applied Biometrics	Dr. Roland Weber 62EE
Arkay Construction	Julius Rivkin 47EE
ATR Electronics	Albert A. Goffstein 31EE
Barr Engineering	Douglas W. Barr 48CME
Bonestroo, Rosene, Anderlik & Associates	Otto Bonestroo 49CME, Robert Rosene 45CE
Braun Engineering Testing	John S. Braun 56CME
Brock-White	George White 44CE, Wayne C. Brock 44CE
CNS	Frederick T. Strobl 71EE
Consolidated Engineering Diversified	Keith P. Caswell, Jr. 50CE
Control Data	William Keye 43EE, Seymour Cray 49EE, Frank C. Mullaney 43EE
Cray Computer	Seymour Cray 49EE
Cray Research	Seymour Cray 49EE, Frank C. Mullaney 43EE
Dacomed	Gerald W. Timm 63EE
Data 100	David J. Ekberg 52ME
Data Product	Erwin Tomash 43EE
E.F. Johnson Co.	Edgar F. Johnson 21EE
EOCON	Larry Larson 59EE
Fabyanski, Svoboda & Westra	Marvin Fabyanski 68ME
FluiDyne	J. Leonard Frame 43AE
Johnston Sahlman	John Sahlman 41CME
Kellogg	Joseph C. Kellogg 51CME
King Research	Maurice King 32CE
Laserdyne	David J. Ekberg 52ME
Malkerson Motors	Lester A. Malkerson 35AG
McElrath Associates	Gale McElrath 41MA
Medtronic	Earl E. Bakken 48EE
Metroquip	H.B. "Bud" Hayden 40CE
Meyer, Borgman & Johnson	John E. Meyer 47CME
Network Systems	James E. Thornton 50EE
Pearson Consulting	John W. Pearson 39CME
Physical Sciences	Dr. Roland Weber 62EE
Possis	Zinnon C. Possis 47ME
Rosemount Engineering	Frank D. Werner 48AE
Schonstedt Instruments	Erick O. Schonstedt 41ME
Schott Corporation	Oscar Schott 34EE
Skyline Displays	Bryan Beaulieu 72ME
Smart Carte	James Muellner 65ME
Sperry Corporation	Robert E. McDonald 40EE
St. Croix Management	Arthur R. Kydd 60AE
Toltz, King, Duvall, Anderson & Associates	Arndt Duvall 25CME
Tomash Publishing	Erwin Tomash 43EE
Triten	Roman Arnoldy 33ME
TSI	Leroy Fingerson 54ME
Twin City Testing	Charles Britzius 33CME
Water Products	Robert J. Wigley 52CME
Watson-Forsberg	John A. Forsberg 49CME
Wolfenson Electric	Sidney J. Wolfenson 40EE
Zero-Max	Richard Schmidt ME

I

ALUMNI SURVEY

Institute of Technology

University of Minnesota
107 Walter Library
117 Pleasant St. S.E.
Minneapolis, MN 55455

October, 1990

Dear Alumnus/Friend of the Institute of Technology:

In an effort to better serve alumni and friends of the Institute of Technology, we are seeking your cooperation by asking you to take a moment to complete the enclosed survey form. The information about yourself, personally as well as professionally, will update our central records and provide us with a profile of our readership. As an alumnus or company representative, your response gives you the opportunity to inform us about issues of concern to you.

This questionnaire has been instituted in an effort to measure our success in educating engineering and science students as well as our success in public outreach and service.

Your participation in this survey will be most appreciated. We will be most grateful for the return of the enclosed self-addressed questionnaire as promptly as possible.

Thank you.

Cordially Yours,

E.F. Infante
Professor and Dean

p.s. A summary of the results of this survey will be published in the Winter issue of *ITEMS*.

Personal Data

NOTE: Information you provide is for University of Minnesota/Institute of Technology use only and will not be sold or made available externally.

Last name _____ First name _____ MI _____ Birthdate ___/___/___

Maiden name _____

Home address _____ City _____ State _____ Zip _____

Home phone _____ Work phone _____

Spouse name _____ Maiden name _____

Preferred mailing address ☐ Home ☐ Work ☐ Other

Income Level
☐ 10,000 - 39,999
☐ 40,000 - 59,999
☐ 60,000 - 99,999
☐ 100,000 - 149,999
☐ 150,000 - 249,999
☐ 250,000 - 399,999
☐ 400,000 - 599,999
☐ 600,000 & above

Do you have children/grandchildren who are or have attended the University of Minnesota?

Name _____ Grad Year _____ Major _____

Name _____ Grad Year _____ Major _____

Name _____ Grad Year _____ Major _____

Employer Information

First employer following graduation (if different from present employer)

_____ Level/Degree _____

Present employer name _____ If retired, year _____

Your title/occupation _____

Company address _____ City _____ State _____ Zip _____

Are you a company founder? ☐ Yes ☐ No

Company name/year started

1) _____ 2) _____

Business type _____ Business type _____

Annual sales _____ Worldwide employment _____ Annual sales _____ Worldwide employment _____

Company still operating? ☐ Yes ☐ No Company still operating? ☐ Yes ☐ No

Approximately how many IT/U of M grads does your company employ? _____

Spouse's employer _____ Title/occupation _____

Academic Information

U of M Deg/Maj/Yr _____

Other degree information: Institution _____ Deg/Maj/Yr _____

Institution _____ Deg/Maj/Yr _____

Fraternity/Sorority name _____

Other student organization involvement _____

Spouse's Alma Mater _____ Deg/Maj/Yr _____

How would you rate your Institute of Technology educational experience:
(+5 extremely beneficial; -5 not beneficial) circle one

+5 +4 +3 +2 +1 0 -1 -2 -3 -4 -5

What is your current attitude about the Institute of Technology:

+5 +4 +3 +2 +1 0 -1 -2 -3 -4 -5

Additional Information

In what professional organizations have you been active as either a volunteer or member?

_____

_____

What corporations/foundations or educational institutions are you or your spouse involved in as a director, trustee or officer? _____

_____

_____

Are there University of Minnesota/Institute of Technology faculty, staff or classmates with whom you have kept in touch over the years? Please list.

Names Addresses

_____

_____

_____

Have you received any special awards or honors, academically or professionally? Please tell us.

_____

_____

Are there any alumni you would like to nominate for an outstanding achievement award?

Names Addresses

_____

_____

Please list name/address of any high ability high school student you know or name/address of magnet high school for U of M recruitment efforts.

Potential Student Magnet School

Name _____ Name _____

Address _____ Address _____

_____ _____

City, State, Zip _____ City, State, Zip _____

Has your work been exhibited, patented or published? Please tell us. _____

_____

_____

Are you interested in using IT's Career Placement Office? ☐ Yes ☐ No
(Please attach a copy of your resume.)

continued on back page

List other people who should be receiving *ITEMS* newsletter.

Name _____ Name _____

Address _____ Address _____

_____ _____

City, State, Zip _____ City, State, Zip _____

Do you prefer to be contacted for your annual gift ☐ by phone ☐ by mail.

Do you wish to continue receiving *ITEMS* newsletter? ☐ Yes ☐ No

Do you wish to continue receiving the IT Annual Report? ☐ Yes ☐ No

Would you/your company be interested in advertising in *ITEMS* newsletter? ☐ Yes ☐ No

Name of contact person _____ Phone number _____

What changes, additions, future feature articles would you like to see in *ITEMS?* _____

_____

Additional comments _____

_____

Do you own a personal computer? ☐ Yes ☐ No

Would you use an IT Electronic Bulletin Board? ☐ Yes ☐ No

Thank you for your participation. *Have you attached a copy of your resume?*

Fold and staple.

_____

_____

_____

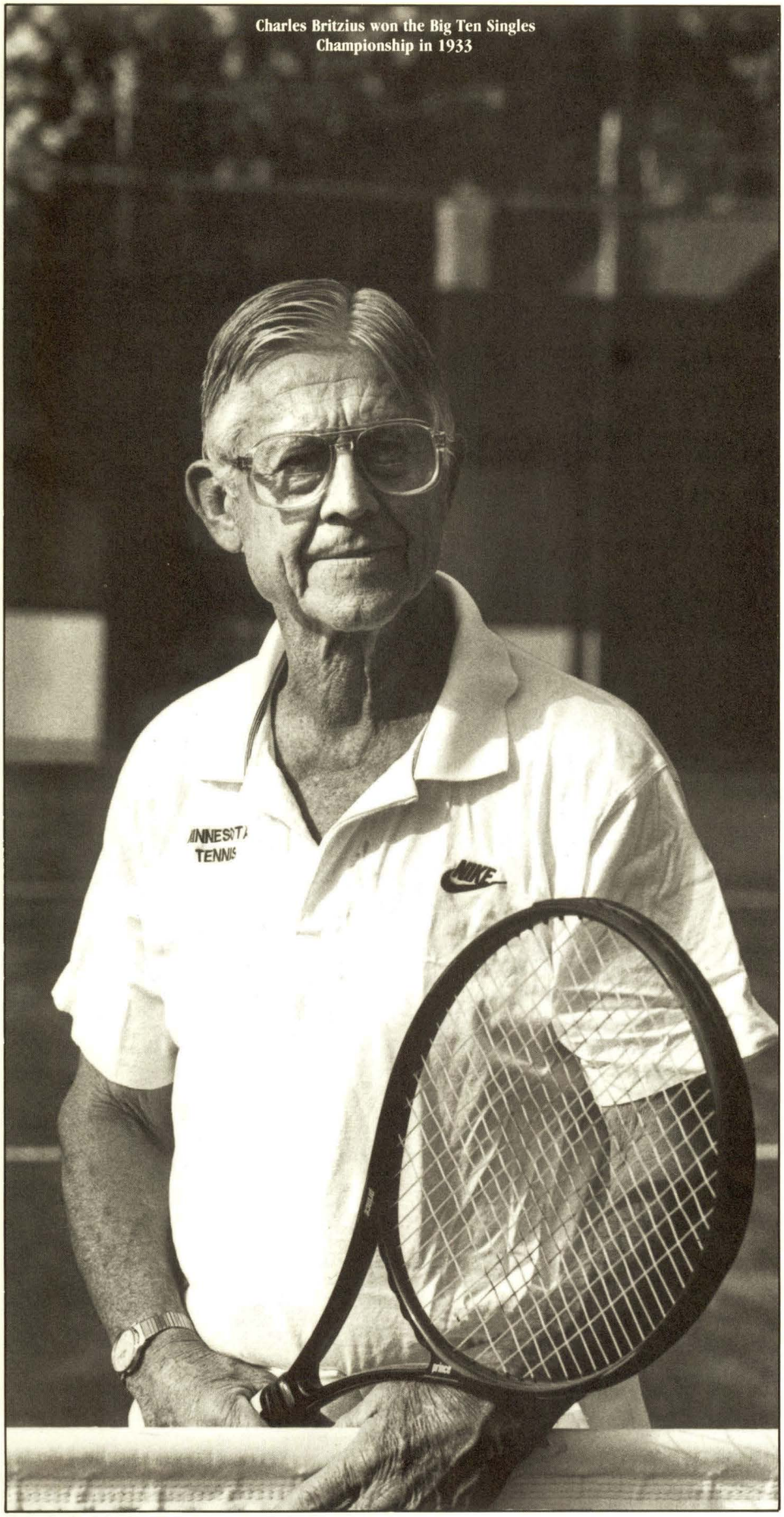
NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS **PERMIT 16972** **MINNEAPOLIS, MN**

POSTAGE WILL BE PAID BY ADDRESSEE

University of Minnesota
Institute of Technology
107 Walter Library
117 Pleasant St. S.E.
Minneapolis, MN 55455-9940



Charles Britzius won the Big Ten Singles Championship in 1933

Photos by Patrick O'Leary

79-Love

In tennis and business, Charles Britzius follows the same game plan for success

It's a hot summer day. Chuck Britzius looks natty on the tennis court in a knit sports shirt and shorts. His feet are well planted on the forehand side of the court. His racquet is ready, and his eye is on the ball as it takes its bounce. Knees slightly bent, he pulls his arm around in a smooth, fluid motion until the racquet makes perfect contact with the ball. But Britzius is not done with this shot yet. He follows through to place the ball precisely where he wants it. While his shot isn't particularly fancy, it's consistent and always over the net. He returns the next 20 shots in exactly the same way.

Tennis is an interesting game; it often offers insights into the personalities of the players. And, no doubt about it, this guy plays tennis like an engineer. In fact, Britzius is a civil engineer. He's also the force behind a 52-year-old engineering firm and a citizen extraordinaire. Learning how this came to be is as telling about the man as watching this 79-year-old man play tennis.

When Charles Britzius was a lad in Rochester in the 1920s, his mother's nephew was an internationally known engineer named Donald Bleifus. Young Charles was pondering his future one day when his mother suggested he become an engineer like his famous cousin.

"It was probably the best decision that was ever made for me," says Britzius today.

As the country was heading into the Depression, young Britzius packed his bags to attend the University of Minnesota School of Civil Engineering. It was a time of high tide in the training of civil engineers, Britzius remembers. All courses were taught by men in their 50s and 60s who knew the field by virtue of experience. Classes in civil engineering had no more than 35 students.

Meanwhile, he played tennis, winning

the Big Ten Singles Championship in his senior year.

When he graduated in 1933, Britzius was lucky to find one of the few jobs available—a position with Hall Testing Laboratories in St. Paul. Two years later, he went back to the University of Minnesota for a master's degree and a position as an instructor. A short time and one job later, Britzius was once again pondering his future. The year was 1938, and he had reached the ripe old age of 27. Ada Bergmann, a former colleague and a behind-the-scenes power at Hall Testing, provided the direction. It entailed buying Hall Testing from then-owner Quincy Hall. Britzius' mother mortgaged her house for the down payment, and the four-person business was launched under the new name of Twin City Testing and Engineering Laboratory.

Although business was rocky in its early years, the coming of World War II brought great demand for its service. Twin City Testing set up several chemical and metallurgical laboratories to test government projects, and other laboratories were built wherever the government set up camp across the Midwest. Although he was eligible for the draft, Britzius, as sole owner of a company important to government work, was never called to the armed services.

When the war ended, peace-time building flourished; and Twin Cities Testing was again in great demand. Gradually the business expanded and became very prosperous.

"We never did any planning like they do today," says Britzius. "And we never had any big promotion. We just expanded, little by little."

By 1985 the company was so prosperous, Huntingdon International Holdings, a British firm, made Britzius and his partners a cash offer for the business too good to refuse. But Huntingdon executives were smart enough to recognize a valuable resource when they saw one. They employed Britzius as a part-time consultant to the company he once owned.

Today, Twin City Testing has 700 employees at 28 locations in 10 states, with plans to add 100 people each year during the next five years to its 350-employee St. Paul facility. The company provides independent engineering and scientific analysis of construction products and the environment for developers, contractors, the Environmental Protection Agency, industry, utilities, and manufacturers.

As a consultant, Britzius maintains the organization's contacts with state engineering societies, the American Society for Testing and Materials, and the state Building Code Structural Advisory Committee. He also maintains his membership in the Minnesota and national Society of Professional Engineers.

And he maintains his tennis game. He plays the sport at least once a week—he's captain of the team—and often squeezes in a second game. In fact, his forehand is the one conceit he seems to allow himself.

"I can get the ball back all day with my forehand," he says with a chuckle. "And I've always said, 'Be content just to get the ball back.' "

When it comes to his business, however, Britzius relates all the details in a rather matter-of-fact manner as though he's been successful because he had a knack for being in the right place at the right time. But his self-effacing manner cannot mask the hard facts of business. No company stays in business 52 years, let alone grows from four to 700 employees, through sheer luck.

Charles Britzius is a man of tremendous energy. He's a dapper dresser with a spring in his Hush Puppies. According to Archie Carter, a consulting engineer who has observed Britzius in action both professionally and socially for 30 years, that may be what has made Britzius so successful.

"He started a company during the Depression when many people did not have the courage," says Carter. "But he had one thing that money can't buy: enthusiasm. He still gets up in the morning with enthusiasm for whatever he's going to do that day."

Carter, who's been playing tennis with Britzius for years, says his moves on the court are metaphorical of the way he lives his life. "He's consistent, and he places his shots well," says Carter. "He will volunteer to help any time you ask him. That wins you a lot of friends, including young people. Many people our age lack that kind of enthusiasm.

"Chuck always respected the ability of his people," Carter continues, "and whenever he was asked about any particular employee, he'd always reply, 'He's a fine fellow.' "

Yet he was never reluctant to make the tough business decisions, Carter says. "I think he realized it wasn't going to be any easier for anyone else to make the toughest decisions," says Carter. "So he made them himself."

Britzius' many board seats and different volunteer positions are a good reflection of his many facets, according to Carter. Britzius has held several positions with the Minnesota and National Society of Professional Engineers and the American Society of Testing and Materials. He's a past president of the Midway Civic and Commerce Association, the Southwest Area Sewer District, University of Minnesota Institute of Technology Alumni Association, and the Kiwanis Club. He has served on the boards of Martin Luther Manor Home for Aging, Northwestern Lutheran Theological Seminary, Gustavus Adolphus College and Carthage College, and still sits on the board of Mt. Calvary Lutheran Church in Excelsior and the board of Bethesda Lutheran Medical Center.

His many contributions have not gone unnoticed. He has received several awards, including the Engineer of the Year Award and admittance to the Theta Tau Hall of Fame. WCCO named him a Good Neighbor, and he won the Minnesota Sports Champion Award.

He's even a Boy Scout, still serving as a member of the Viking Council Executive Board.

As one might guess, Britzius' view of the world is optimistic, although he's not always content with the status quo. When he was elected mayor of the Village of Deephaven in the mid-1960s, for example, Britzius favored smaller lot sizes and commercial zoning in the village where he has lived since 1947. But, apparently, the voters did not. He was defeated for re-election.

"The people of the village didn't want to share the lake with anybody," he recalls. "I didn't think that was right." Then, with a slight smile, he adds, "I guess I was too liberal."

Politically, he's delighted, although not surprised, at the unification of Europe. And although he calls himself a renegade on church policy, he's also a political conservative.

"The government is too involved in everything we do now," he says. "And I pooh-poohed that Alar scare right from the start. I think there are sinister forces supporting Greenpeace, and I'm a big supporter of nuclear power. Three Mile Island was not a disaster."

But probably more important, he has faith in the young people of today. He often speaks to junior high and high school students telling them to study science and engineering.

"We need technical people," he tells them. "Take your math, and take your physics."

And by the way, he could just add, "learn to play tennis." I

By Judith Yates Borger

Today, Britizius works as a consultant for the firm he founded

All in the family

Charles Britzius evidently knows a good education when he gets one. Among Twin City Testing Corporation's more than 700 employees are the following University of Minnesota graduates:

Richard Alberg (Chemistry 1968), Quality Assurance/Quality Control Coordinator; John Amundson, P.E. (Civil 1986), Civil Engineer; Loren Braun, P.E. (Civil 1976, Mechanical 1984), Senior Project Engineer; Patrick Francis (Civil 1982), Manager of Geotechnical Field Operations; Michael Gronseth (Geological 1985), Geotechnical Engineer; Gregg Jandro (Geological 1979), Branch Manager;

Kerry Keen (Geology 1988 M.S.), Senior Hydrogeologist; Walter Koenst (Fisheries Biology 1970 B.S., Fisheries Biology/Statistics 1975 M.S.), Manager of Water Quality and Biological Services; William Lange (Civil 1973), Manager, Geotechnical Department; Barbara Larka (Biochemistry 1975), Supervisor, Mass Spectometry; Michael McCarthy, P.E. (Civil 1980), Principal Engineer; Charles McJilton, Ph.D. (Physical Science 1962 B.S., Environmental Health 1965 M.S.), Certified Industrial Hygienist;

Lewis Ng, P.E. (Civil 1984 M.S.), Chief Engineer/Supervisor of Restoration Engineering; Mark Oppen (Environmental Health, M.S.), Environmental Project Manager; Keith Pashina, P.E. (Civil 1979), Project Manager, Restoration Engineering and Construction; Eric Pederson (Civil 1980), Manager of Construction Services; Leonard Rasmussen (Aeronautical 1966, Civil 1973), Senior Staff Engineer; David Recker (Master of Business Administration 1976), Manager of Construction Engineering Department; James Rudd (Mechanical 1971), Chief Geotechnical Engineer;

Howard Schultz (Civil 1950), Engineering Supervisor/Radiation Safety Officer; Tom Sinn (Environmental Health 1978 B.S., Public Health 1978 B.S.), Senior Project Manager; George Sowada (Soil Science 1954), Quality Assurance Specialist; John Stieben (Civil 1990), Staff Engineer; Robert Struve, P.E. (Civil 1973), Vice President of Geotechnical/Construction Materials Division; Cheryl Sykora (Industrial Hygiene M.S.—pending), Manager of Industrial Hygiene Department; Steven Talafous, P.E. (Civil 1981), Field Engineer. I

Judith Yates Borger is a freelance writer in the Twin Cities.

Eureka!

When Edward Cussler, professor of chemical engineering began his research on chemical separation at the University in 1982, he had four teenage children at home. "Every Thursday my wife would buy eight gallons of milk at the market, and by Sunday the milk was gone," Cussler says. "Milk is 93% water. I got the idea that if we could remove some water at the farm, we could make milk more convenient, like orange juice concentrate."

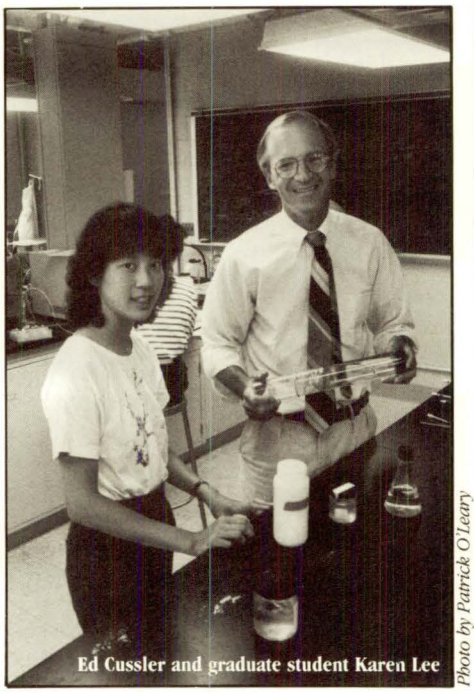
Eureka! An idea was born. And like most ideas for new inventions, it came about from looking at everyday needs. But the dream of making milk more convenient has led Cussler and his co-workers to more than just new scientific discoveries during the past eight years. It has also taught them about the unexpected pitfalls that await new inventions that venture from the laboratory into the corporate world.

The invention that took shape in Professor Cussler's lab to tackle the milk challenge is a special hydrogel. Hydrogels are polymers whose structure swells in water; gelatin is a familiar hydrogel, as are gumdrops.

Established technologies to separate unwanted water from a given material generally use a selective membrane that passes water and retains the solids. Cussler, however, thought it wiser to reverse this process—to use a filter to retain the abundant water and pass the relatively small amount of solids.

Cussler's hydrogel approaches this operation like a reusable selective molecular sponge. When added to a very dilute solution, the hydrogel absorbs water and low molecular weight solutes and leaves behind a concentrate of higher molecular weight species. The concentrate is then removed and further processed, while the swollen gel is recovered, made to give up its water, and used again. The simplicity of the operation and the reusability of the gel make it attractive vis-a-vis conventional methods of separation.

At the beginning of the milk concentration project, Cussler was intrigued by the work of Toyoichi Tanaka, a physicist at MIT. Tanaka had synthesized hydrogels whose volume was a strong function of pH. By changing the pH of the gel, he could cause it to absorb a great deal of water or to collapse back to its original volume. These unique reversible hydrogels have their origin with Karel Dusek, a Czech scientist who, it is said, worked out some of the gel theory while sitting in Paris cafes during a sabbatical. Cussler observes with a smile, "Out of the Paris cafes, twenty years later, you begin to get a useful product idea."



Ed Cussler and graduate student Karen Lee

Photo by Patrick O'Leary

A quartet of milk-thirsty teenagers inspired promising new separation technology

By James Marti

Unfortunately, the original hydrogel invented in the cafes of Paris was not perfect. Early work in Cussler's lab by graduate student Markus Stokar showed that while the gel separation principle was sound, the pH sensitive gel would not work with solutions containing calcium—a fatal flaw for any milk-concentrating scheme.

Then, in 1983, Micha Ilavsky of Czechoslovakia discovered a hydrogel that was temperature sensitive; it would swell up to many times its original volume as the temperature dropped from 35 to 33 degrees Celsius. Cussler and graduate student Roberto Freitas demonstrated that this temperature-sensitive gel would work in milk, and work well. It absorbed not only water but also the sugar lactose—good news for the 20 percent of the U.S. population that is lactose intolerant.

With these gels, one could simply drop the hydrogel into cool milk, allow it to swell by absorbing water and lactose, retrieve the swollen gel from the now concentrated solids, and drop the gel into warm water where it would collapse and give up its water. The gel could be recovered, and the small amount of heat needed for the collapse could be provided, for example, by the waste heat of electric power plants. The gel process would be attractive for other uses, such as concentrating dairy whey, blood, or proteins of commercial interest, such as fish or soy.

The theoretical details of how the hydrogel performs its sponge act have occupied several researchers since Dusek—among them Cussler, his graduate student Marcello Marchetti, and Steve Prager of the chemistry department. In the swollen state, explains Cussler, the molecules of the polymer gel spread out and mingle freely with water molecules. At a certain temperature, the polymer undergoes a phase transition, similar to that undergone by a gas condensing to liquid. The gel molecules collapse to a more

compact structure and interact with themselves to the exclusion of water molecules.

By 1985, Cussler and his co-workers felt they had a workable invention. So did the University, which expressed interest in patenting the hydrogel process. At the time, the University required a corporate client to be involved with the product, so Cussler formed a company called Geltec. "The University patented the stuff," says Cussler, "And it died."

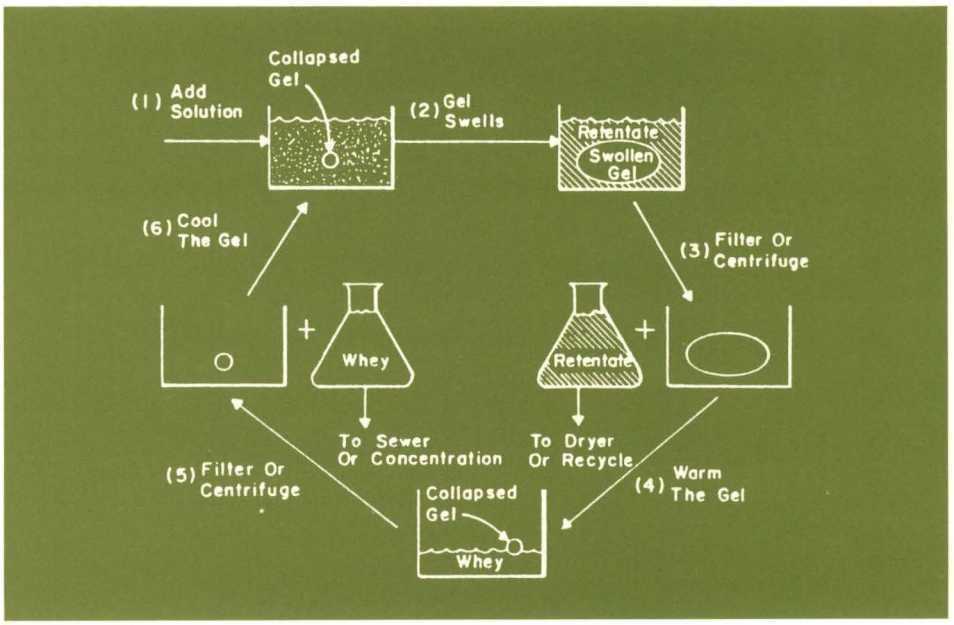
Died? How could an invention with such promise go nowhere?

Cussler explains. "This was exotic, off-the-wall technology. No one was sure they wanted to come anywhere near it." The chemical industry is highly capital intensive and tends to be conservative regarding new products, according to Cussler. When a radically different idea like hydrogel separation comes along, it is likely to get a chilly reception.

"Even once we demonstrated industrial practicality, we were still way short of business practice," says Cussler. And that's the kind of viability venture capitalists seek. The lack of response from the business sector forced the hydrogel technique back into Cussler's lab.

Hydrogels may have continued their sheltered existence if not for Dale Johnson. At 75, Johnson is a world authority on soybeans and soy protein. He is also a University alumnus who graduated in the same class as the man for whom the chemical engineering building is named, Neil Amundson. One day in 1987, Johnson walked into Cussler's lab with a question: Would the gel process work on soy protein separation? After a couple of years' work, Cussler and Johnson realized the answer was yes. The group redirected efforts to the soy protein process in the lab while Johnson took over as president of Geltec.

Under Johnson, Geltec succeeded in winning a start-up grant from the Greater Minnesota Corporation. Once more, the gel separation idea was brought before several potential industrial sponsors, and once more, the response was lukewarm. Several companies expressed initial interest, only to shy away from the anticipated investment that the gel process would require. The outlays are substantial. Graduate student



Steve Trank estimates that a separation plant based on the gel technology would require $30 million to be profitable.

The task now before Johnson and Geltec is to nurture their gel process until it can attract substantial corporate investment. One way they'll do this, says Cussler, is to take the gels on the road. Johnson and his staff now are working to build a prototype gel separator, mounted on a pickup truck, that they can bring to potential industrial clients.

As their invention gets ready to go on tour in search of sponsors, Cussler and his students are off working on other dreams. The lab continues its work in chemical separations, developing membranes for applications ranging from water softeners to artificial gills. Many of these processes are not yet well understood. "If I understood them," says Cussler, "I wouldn't work on them."

Even as he turns to other projects, however, Cussler is troubled by the experience of his hydrogel invention. Selling the gel idea, he says, points out the gap that separates university research and industrial practice, particularly the chemical industry. Inventions born in university research labs can be developed only to a certain point. Then the project must be set aside in favor of new pursuits. The university's role is, after all, not product development but education and academic research.

As Cussler puts it, "Universities are keepers of the flame; their purpose is to sustain human knowledge. In doing this, university research labs must look for breakthrough technology, because no one else will." However, the breakthrough technology coming out of university labs is often not developed enough to interest industrial sponsors. The result, says Cussler, is that many good ideas fall into neglect; they fail to make the rugged transition to the marketplace.

What is needed, Cussler asserts, is an institution to nurture these inventions to the point where commercial interests will take over. Such institutions are not unknown—Japan and West Germany already have them in place. Will the lack of similar institutions in the United States hinder its efforts in global industrial competition?

The experience of hydrogels is suggestive: Until "nurturing centers" for new inventions become widespread, future innovative ideas like Cussler's hydrogel may be born, but chances are they'll never survive past the incubation stage in university laboratories. I

FACULTY

Dynamic duo

For some professors in the academic whirlwind of research, publication, and professional conferences, undergraduate instruction becomes merely a routine chore. Yet, mechanical engineering professor Suhas Patankar and chemistry professor Louis Pignolet don't see it that way. Although both professors have achieved international reputations in the scientific community, they gain immense satisfaction from simultaneously inspiring and nurturing future scientists.

In recognition of their efforts, Patankar and Pignolet were among ten University of Minnesota professors who this spring received the Horace T. Morse-Minnesota Alumni Association Award, the University's highest award for distinguished scholar-teachers. The award has been granted since 1965 to outstanding professors like Patankar and Pignolet who contribute to undergraduate education in four areas: teaching, advising, academic program development, and educational leadership. In addition to commemorative sculptures and certificates of recognition, awardees and their departments receive annual gifts of $2,500 for three consecutive years.

For Patankar, however, this award is only part of the reward he reaps for his work. Every day he reaps the benefits when he sees his students smile and nod that they understand complex concepts. Known as a pioneer in the area of computational heat transfer and fluid flow, he has adapted his research on the topic to create not only an undergraduate-level course and textbook, but also a number of educational computer software programs to enrich the classroom experience.

Patankar, who is tremendously interested in the teaching and learning process, feels that the most important aspect of teaching is clarity of presentation. "I constantly think about better ways to explain difficult concepts," he says. Patankar also strives to create a caring, compassionate atmosphere of mutual respect in his classes. He maintains that this, in turn, nurtures a strong self-image in his students that helps them succeed in all facets of their lives.

"He has that magical quality that only a few teachers in our lifetimes possess," says one of his former students, Susan Matthias. "He got through to me. Every single day."

Aerospace Engineering

Professor *Gary Balas* received the Best Paper Presentation in Session Award at the 1990 American Control Conference. Professor *Daniel Joseph* was awarded the 1990 G.I. Taylor Medal by the board of directors of the Society of Engineering Science in recognition of his outstanding work in fluid mechanics. Four new faculty members joined the department fall quarter: associate professor *Lev Truskinovsky* and assistant professors *Amy Alving, Ellen Longmire,* and *Thomas Shield.* Truskinovsky and Shield specialize in solids and Alving and Longmire in fluids.

Agricultural Engineering

Professor *Frederick Bergsrud* and assistant professor *Chuck Clanton* received a $16,985 grant from the Minnesota Department of Agriculture to study management of livestock wastes. Clanton, along with associate professor *Philip Goodrich,* also received a $55,985 grant from the Greater Minnesota Corporation (GMC) for work in precision manure application. GMC also awarded the following grants to department faculty members: associate professor *Larry Jacobson,* energy savings in swine farrowing, $43,094; associate professor *Kevin Janni,* saving energy in turkey production, $39,991; associate professor *John Nieber,* watershed assessment of chemical agriculture, $90,572. Janni was also elected Best Professor in the department by IT students. Assistant professor *Chang Ho Park* was awarded a $209,000 grant from the Upper Minnesota Valley Regional Development Commission to study lowering feedstock costs for PHBV production. PHBV is one of the biodegradable plastics made by microorganisms. Park also received a $18,000 grant from the American Chemical Society Petroleum Research Fund to study butanol fermentation and separation.

Chemical Engineering

Regents' professor *Rutherford Aris* received an honorary doctor of engineering degree from Notre Dame University in May. Professor *H. Ted Davis* will continue as department head through May 1995. Davis recently received the George Taylor Distinguished Service Award and the American Institute of Chemical Engineers (AIChE) Walker Award for excellence in contributions to chemical engineering literature. He also presented invited lectures through the Louis T. Pirkey Centennial Lectureship at the University of Texas at Austin and as the Kelly Distinguished Lecturer at Purdue University. Professor *William W. Gerberich* has been selected to serve on the advisory board for *Advances in Corrosion Science and Technology,* a Plenum Press publication. *Jose L. Martins* has been named Ray D. Johnson-Mayon Plastics Professor. Regents' professor *L.E. Scriven* has been named Fellow of AIChE and elected co-chair to the Board on Chemical Science and Technology of the National Research Council.

Chemistry

Professor *W. Ronald Gentry* and Susan R. Damme received a one-year grant of $64,000 from the National Science Foundation for their proposal, "An Environmental Approach to Enhanced Retention and Recruitment of Women and Minorities in Chemistry, a Pilot Study." Assistant professor *Steven Kass* received a two-year grant of $40,000 for his PRF-AC proposal, "Unimolecular Rearrangements of Ions in the Gas Phase." Professor *Guang Ming Xia* was elected Best Professor in the chemistry department by IT students.

Civil and Mineral Engineering

Professor *Cesar Farell* of St. Anthony Falls Hydraulic Laboratory received a NATO Collaborative Research Grant from the NATO Scientific Affairs Division for wind engineering research with professor H.J. Niemann, Ruhr-Universitat Bochum. The grant will initiate an exchange program between the wind tunnel grants at the University and Ruhr-Universitat Bochum. Associate professor *John Gulliver* of St. Anthony Falls Hydraulic Laboratory received the 1990 Rickey Medal from the American Society of Civil Engineers for his contribution to the science of hydroelectric engi-

Louis Pignolet (left) and Suhas Patankar

Like Patankar, Pignolet delights in firing his students' enthusiasm and has played a major role in shaping the undergraduate experience at the University. As former director of undergraduate studies (a position he will resume this fall) and chair of the chemistry department, Pignolet developed a successful advising structure and has also played a large part in revising the undergraduate chemistry curriculum.

He maintains that the integration of teaching and research is central to the education of undergraduates. He consistently invites students to share in his research and publication in the area of inorganic and organometallic chemistry. He has also created an honors laboratory for promising freshmen in chemistry and chemical engineering where he works in the lab directly with the students. "He did this not as the result of an assignment or even a suggestion by the department," says chemistry professor Doyle Britton, "but simply as a labor of love."

"My style of teaching is best described as one that tries to stimulate students to think for themselves, take risks in their learning by independent activity, and not be overly concerned about grades," says Pignolet. "We must teach students to grow as individuals rather than to be high-achieving, grade-seeking robots."

Pignolet's commitment to developing creative, independent scientists extends beyond the bounds of the University. Through an outreach program he organized, undergraduate and graduate students voluntarily visit primary and secondary schools to give demonstrations and spark children's interest in chemistry. According to Stephanie Miller, the department's coordinator of undergraduate studies, "Professor Pignolet has such a love for the field, he wants to share it with others so they can experience it, too." I

By Terri Peterson Smith

neering. Professor ***Malcolm T. Hepworth*** participated in an interdisciplinary course during first summer session. The course, titled "Waste Management Policies, Procedures and Issues: An Interdisciplinary Study," was designed to develop a greater degree of involvement by academia in community issues pertaining to the environment.

Earth Sciences

Professor ***Subir Banerjee*** received a Transfer of Technology through Expatriate Nationals Award by the United Nations Development Program. Banerjee will spend four weeks at the National Geophysical Research Institute in Hyderabad, India, to restructure and invigorate their research efforts in rock magnetism and paleomagnetism. Assistant professor ***Larry Edwards*** received a McKnight Land-Grant Professorship, which will support his research in paleoclimate. The award, one of seven presented to University faculty, is given to outstanding junior faculty members. ***Roman Kanivetsky,*** senior scientist for the Minnesota Geological Survey, was technical program chair for the first U.S./U.S.S.R. Joint Conference on Environmental Hydrology and Hydrogeology, held in Leningrad on June 18-21. Professor ***David Kohlstedt*** was elected chair of AGU's Tectonophysics Committee on Physical Properties of Earth Materials. ***Karen Kleinspehn*** and ***Chris Paola*** have been promoted to associate professors and granted tenure. Regents' professor emeritus ***Herbert E. Wright*** received the 1990 Science Achievement Award from the Science Museum of Minnesota for distinguished contributions to the advancement of science and technology.

Computer Science

Assistant professor ***John Riedl*** has been awarded a National Science Foundation subcontract through Purdue University. The $60,169 subcontract will support the design and development of a system that permits collaborative software engineering. Riedl will work with Purdue professor Pasun Dewan, the principal investigator for the project. Professor ***James Slagle*** has been named a Fellow of the American Association for Artificial Intelligence.

Electrical Engineering

Professor ***Fred Bailey*** presented an invited lecture, "Loop Gain Phase Shaping in Single-Input-Single-Output Robust Control," at the University of Notre Dame in May. Assistant professor ***Stephen Chou*** and his students constructed an ultra-high resolution electron beam lithography system with which they have been able to produce metal lines 100 angstroms wide and patterns of a pitch size of 250 angstroms. The pitch size is two times smaller than anyone else has been able to fabricate. In a National Research Council report on "Materials Science and Engineering for the 1990's," professor ***W. Peria*** was honored for his contributions to the development of Auger spectroscopy through the excellent laboratory training he provided his students. Associate professor ***Dennis Polla*** was a panel co-moderator at the 1990 American Electronics Association Engineering Education/R&D Forum in Santa Clara, Calif., in May.

Mechanical Engineering

Max Donath, Thomas H. Kuehn, and ***Terrence W. Simon*** were promoted to full professors. Simon was also chosen as Best Teacher in mechanical engineering by IT students. ***Homayoon Kazerooni*** and ***Haeok Skarda Lee*** were promoted to associate professors. ***Kumar K. Tamma*** was granted tenure as associate professor. Assistant professor ***Steven L. Girshick*** received a $200,000 National Science Foundation grant for Plasma Synthesis of Ceramics: Studies in Particle Nucleation and Growth. Professor ***Warren E. Ibele*** was reelected chair of the Faculty Consultative Committee for 1990-91. ***Shahrukh A. Irani*** joined the department as an assistant professor. ***Yechiel Shulman,*** professor and holder of the H.W. Sweatt Chair in Technological Leadership, has been named director of the Center for Development of Technological Leadership. I

LETTERS

Encourage would-be scientists

As a graduate of IT (1975, Physics), I read the article, "Breaking the gender barrier," in the latest ITEMS with interest. I have a couple of observations to add.

First, I'm pleased to see Dean Kohlstedt's statement, "We're trying to convey the message that...you don't have to be a straight-A student to go on to graduate study," for that would mean that IT has changed for the better since I graduated. I recall very clearly bringing up the subject of graduate school with my (female) adviser in IT, who blurted out, "You want to go to graduate school? With your grades?" I ignored her, graduated "with distinction," and went to graduate school for two years. Although I did not get my master's degree, I found it a richly rewarding experience and I do not regret my decision. I would hope that if I got my degree today, my adviser would be more supportive.

Second, throughout my graduate and undergraduate years, I was strongly discouraged in majoring in physics and astronomy because, I was told, there would probably not be a job for me in the field when I graduated. I therefore shed no tears for those who complain of a "shortage" of scientific professionals today (male and female). Students should never be discouraged from a career in science because of expected future job prospects. Instead, all students with a scientific interest should be encouraged to follow that interest, no matter what the job market is at the time. Perhaps if colleges and universities had spent less time discouraging eager would-be scientists in the 1970s, there would be no shortage of scientific professionals in the 1990s.

Joan Marie Verba
Physics 1975

PREVIEW

Crumbling foundations?

America's infrastructure—especially its transportation systems—is in a precarious state of disrepair. National experts and segments of the media—including the popular television documentary series "60 Minutes"—have tried to sound the alarm, but no one seems to want to listen.

"It's very easy to procrastinate when it comes to maintaining our infrastructure," says Richard Braun, head of the civil and mineral engineering department and director of the Center for Transportation Studies. But it's a problem with which we must contend—soon, he adds. In the next issue, *ITEMS* will give you an insider's look at America's "Fragile Foundations." I

DEATHS

Khaled A. Bagdadi *(Geophysics 1977 M.S., 1981 Ph.D.),* on April 29 of cancer. After earning his doctorate degree, Bagdadi began working for E.K. Lehmann and Associates in Minneapolis as a mineral exploration geophysicist. In 1984, he became a faculty member of the King Saud University in Riyadh, Saudi Arabia, where he initiated a program in geophysics. In 1987, Bagdadi moved to Seattle and began a successful geophysical consulting firm specializing in software development and geophysical investigations of environmental pollution and hazardous waste disposal problems.

Gust Bitsianes *(Chemical Engineering 1941 B.S., 1946 Ph.D.),* 70, professor of mines and metallurgy, of cancer on June 14. A native of Virginia, Minn., Bitsianes worked on the Manhattan Project at the Massachusetts Institute of Technology from 1944 to 1946. After earning his doctorate degree, he became an assistant professor at the University in 1946 and a full professor in 1961. Bitsianes received national awards for his research on high-temperature metallurgical reactions and his contributions to technological improvements in the Minnesota iron-ore industry.

Sidney C. Larson, 80, electrical engineering professor, on June 1 of pancreatic cancer. Larson, a native of Brookings, S.D., earned his undergraduate degree at South Dakota State University and his master's and doctorate degrees in electrical engineering from the University of Wisconsin-Madison. Before joining the University of Minnesota faculty in 1941, Larson worked four years for General Electric X-ray Corp. in Chicago. In addition to his teaching and research at the University, Larson did consulting work for private firms and, after his retirement in 1977, served as an expert witness in electrical accident lawsuits.

Henry Lepp *(Geology 1954 Ph.D.),* 68, professor emeritus and former head of the Macalester College geology department, on May 27. Lepp, an immigrant from Russia, grew up in Saskatchewan, Canada, and earned his undergraduate degree in geological engineering from the University of Saskatchewan. Before beginning his work as a professor at the University of Minnesota-Duluth in 1954, Lepp worked as a geologist for mining companies in the Yukon and Northwest Territories in Canada and in French West Africa. He was professor and chair of the Macalester geology department from 1964 to 1989 when he retired. Lepp wrote many articles for professional journals and was the author of two textbooks.

Clarence E. Lund *(Mechanical 1933 B.S., 1934 M.S.),* 84, professor emeritus of the University of Minnesota mechanical engineering department, on July 6. Lund, who retired in 1974, taught primarily undergraduate students and was director of the mechanical engineering intern program. His areas of research included heating, ventilation, and air conditioning. He wrote more than 130 papers and articles.

Kenneth E. Sorenson *(Civil 1939 B.S., 1946 M.S.),* retired chairman of the board of directors of Harza Engineering Co. and a noted water resources engineer, in July. Sorenson, a native Minnesotan, served with the SeaBees in World War II and joined Harza in 1946. His major accomplishments include irrigation work in the Jordan River Valley and hydroelectric projects in Zaire, Venezuela, Argentina, Paraguay, Pakistan, and El Salvador. I

ALUMNI

1947

John H. Dittfach *(Mechanical, 1948 M.S.)* professor and associate department head of the University of Massachusetts mechanical engineering department, is retiring after 42 years of service.

1949

Ev Dale *(Electrical)* has accepted a position as manager of quality assurance for the High Purity Products Group of the Donaldson Company. Dale, who is a member of the IT Board, previously held positions as manager of quality improvement and new product introduction at Northern Telecom, director of quality for Honeywell Aerospace Division, director of quality assuarance and product safety at Fingerhut Corp., and manager of product assurance at McQuay Group.

1957

Donald H. Craighead *(Mechanical)* has started DHC Enterprises Inc. of St. Paul, a consulting business aimed at a number of power transmission related activities. Craighead recently sold Power/mation division of Craighead and Associates—a company he founded in 1961—to a group of its sales representatives.

1978

Daniel P. Finstad *(Mechanical)* is a senior project engineer of business planning and analysis at the GM Technical Center in Warren, Mich.

1980

Jeffrey H. Maki *(Mechanical)* recently moved to Fairmont to take a position as 3M product manager for decorative ribbon.

1981

William J. Schmidt, II *(Chemical)* received his Ph.D. degree in chemical engineering at the University of Notre Dame in 1985 and is currently a research engineer for Shell Development Co. in Houston, Texas. Schmidt is developing advanced process control theory and algorithms and teaches classes.

1982

Thomas R. Arneberg *(Electrical)* is a senior computer-aided design engineer for Bipolar Integrated Technology Inc. (BIT) in Beaverton, Ore. Arneberg is in charge of BIT's standard Cell ASIC library that is used to build the world's fastest SPARC and MIPS RISC microprocessor chips. He also sings in the state champion barbershop quartet, "Done Deal."

Michael F. Roman *(Electrical)* is a supervisor in Software Design Services for the 3M Company in St. Paul.

1983

Christopher F. Thompson *(Civil and Mechanical)* is the principal environmental engineer and manager of the Minneapolis office of SEACOR Environmental Engineering, a national consulting engineering firm.

Keith Westrum *(Mechanical)* is a research design engineer for the Tennant Company in Minneapolis. Westrum is chair of the Minnesota section of the American Society of Mechanical Engineers (ASME) and previously served as vice-chair (1989) and treasurer (1988) of that organization.

1984

David J. Myren *(Mechanical)* is a project leader for FluiDyne Engineering in Minneapolis.

Michael Sorensen *(Mathematics)* is a business planning analyst for Northgate Computer Systems in Plymouth. He received his master's of business administration degree with a concentration in finance from the University in 1989.

Timothy Troske *(Electrical)* is division manager of gun systems for Naval Ship Weapons Systems Engineering Station (NSWSES) in Port Hueneme, Calif. Troske has worked at NSWSES since 1985 and was named "Trainee of the Year" in 1987.

1986

Judson K. Champlin *(Electrical)* graduated from law school in 1989 and is an attorney for Kinney & Lange, Minneapolis. He practices in the area of intellectual property law, which encompasses patents, trademarks, copyrights, and related litigation. I

REUNIONS

ME class of 1940 celebrates 50th reunion

Twenty-seven members of the mechanical engineering class of 1940 returned from across the U.S. to celebrate their 50th reunion on July 26, 1990, at the Midland Hills Country Club in Roseville, Minn., Mechanical engineering emeritus professor Fulton Holtby (first row, fourth from left) attended the reunion as a guest of his former students. I

(Left to right) ***First row:*** **Dave Thomas, Ralph Britigan, Herb Mahle, Professor Holtby, Harlan Benson, Bill Caddy.** ***Second row:*** **Tom Saari, Dick McGee, Larry Whalen, Bob Callaway, Curtis Lundblad.** ***Third row:*** **Larry Pittelkow, Dick Marquardt, Bill Ellis, Willard Isfeld, Will Davis, Phil Teeter, Warren Wood, Peter Oreskovich, Dixie Wilson, Erwin Franzen, Vince Gibney, Bob Larson, Bob Lunn, Don Maddle, Don Plum, Vince Walker**

CALENDAR

October

11-13 IT Reunion
Class of 1940
624-2006

15 Chemical Engineering All-Alumni Reunion
Chemical Engineering and Materials Science Department, 625-1313

25 Science and Technology Day Banquet &
IT Alumni Society Annual Meeting
Guest Speaker: Dr. Fennell Evans, Director, Center for Interfacial Engineering
Minnesota Alumni Association, 624-2323

November

19 Van Vleck Lecture
Guest Lecturer: Charles H. Townes
School of Physics and Astronomy, 624-7375

19-20 Symposium on Supercomputer Simulation of Semiconductor Devices
Minnesota Supercomputer Institute, 624-1356

ITEMS

University of Minnesota
Institute of Technology
107 Walter Library
117 Pleasant St. S.E.
Minneapolis, MN 55455

Nonprofit Org.
U.S. Postage
PAID
Minneapolis, MN
Permit No. 155